

ABSTRACT 36

The Health Consequences of Homemakers Exposure to Indoor Pollutants.

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A primary indoor air quality concern in Asia, and elsewhere in the developing world, is pollution in the home. Principal sources of domestic pollution are heating and cooking fuels. Other sources of toxic substances in the air may include household cleaning and maintenance products, and by-products from human activities. Pollutants may be present in homes that are typically poorly ventilated or completely unventilated. As a consequence, occupants who spend much of their time at home, such as the housewife/homemaker, may be exposed to high contaminant levels, which may in turn lead to excessive morbidity.

The hypothesis that homemakers experience excessive ill health was investigated using data from the US National Health Interview Survey. Analysis showed that homemakers have a significantly higher prevalence of several types of cancer than women working outside the home. While the data used for this analysis are not Asian in origin, the findings are relevant as an example of the potential health consequences of exposure to indoor pollutants in the home.

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ABSTRACT 37

Continuous Measurement of Indoor Air Quality in Office Buildings in Japan.

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In several office buildings in the Tokyo metropolitan area of Japan indoor air quality characteristics such as air temperature, relative humidity, air velocity, airborne dust concentration, carbon dioxide concentration and noise level were measured for 24 hours continuously. The measuring instruments were installed on the desk at the center of the office and the output data from the instruments were recorded by a digital data recorder or a portable computer.

Thermal conditions were influenced by the ability and operating time of the central heating, ventilating and air-conditioning (HVAC) systems. Air contamination and noise level fluctuated according to the occupants' activities, e.g. tobacco smoking or office machine operation. It was also found that if occupants were still working in the office after the HVAC system was switched off, air quality such as thermal conditions and air contamination became worse.

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ABSTRACT 38

Indoor Air Quality, Ventilation and Energy Saving.  
Qigao Chen, Department of Architecture, Chongqing Institute  
of Architecture and Engineering, Chongqing, Sichuan, China.

Indoor air is polluted from many different sources, including the materials used to construct and decorate homes. One method of maintaining a high indoor air quality is by ventilating a building with fresh outdoor air. However, this system introduces substantial energy loss. To overcome this problem, a heat exchange device to remove the heat in waste air can be introduced. One of the most effective of these devices is the heat pipes exchanger whose design will be discussed.

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ABSTRACT 39

Refrigeration to Utilize Waste Heat and Improve Working  
Conditions.

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of Architecture and Engineering, Chongqing, Sichuan, China.

Many industrial processes, including those in the metallurgical and chemical industries and in the production of electrical power, generate vast quantities of hot water and steam that makes the working environment uncomfortable and that may reduce the product quality. A means for improving the environment whilst utilizing this otherwise wasted energy source by air-conditioning and refrigeration will be presented.

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ABSTRACT 40

How safe are the maximal exposure levels of carbon monoxide?  
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Carbon monoxide (CO) is produced from incomplete combustion of organic material, including petroleum and diesel products used to fuel internal combustion engines for vehicular transport. Acute CO intoxication is a potential problem in man, and has been much studied; the effects of chronic exposure have not been investigated as intensively. Maximum exposure levels have been recommended by various expert committees, and regulations are in force to limit exposure of individuals in the workplace. This communication considers these maximal exposure levels with respect to country and time, and relates these to the toxicological database for carbon monoxide.

The acute toxicity of carbon monoxide follows the inhibition of cellular respiration that occurs when the gas combines reversibly with various haeme pigments. With respect to haemoglobin, for example, carbon monoxide has an affinity at least 200 times that of oxygen, thus reducing the oxygen carrying capacity of blood. An indication of the extent of exposure in man can be obtained from the uptake of CO, measured in the blood as the carboxyhaemoglobin level (% CO-Hb). In people breathing "apparently clean" air, there is always some CO-Hb detectable (0.5-1%), no doubt arising from both endogenous production of the gas, and its presence in air as a result of the metabolic breakdown of the chlorophyll of plants. Urban air, or indoor air heavily contaminated by combustion products, may result in CO-Hb levels of up to 3%, whereas in the cigarette smoker these may be 9%, and on occasions of excessive pollution they can exceed 20%.

Exposure of man to carbon monoxide that results in accidental or self-induced fatality is associated with a post mortem CO-Hb in excess of 40%, and usually 60-70%. The relationship between ambient carbon monoxide levels and the % CO-Hb in exposed individuals could be used as a basis for predicting the safety margin between regulatory levels and acute toxicity.

The relationship between exposure and % CO-Hb in laboratory animals and man are compared. There are distinct differences between man and animals, unless stringent precautions are taken to control the exposure time. It is concluded that prediction of the safety margin for acute intoxication of man from carbon monoxide from % CO-Hb in the blood can be achieved.

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## ABSTRACT . 41

Non-occupational Exposure to Lead in an Occupational Setting.  
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In a small metal-processing plant, 3 out of 7 workers who engaged in a solder-casting process showed a slight increase in their blood lead level. The atmospheric lead concentration in the casting room, however, was not high and the blood lead level of the workers was not correlated with their working time. Subsequently, several non-lead workers were found to have increased blood levels of lead. Following the search for possible lead exposure routes, several improvements in procedures were proposed. These included: installation of a local ventilation system to the furnace and a wash basin with a hand-washing brush in the solder-casting room, watering the ground to reduce dust from slag dumping, and a wet mat at the entrance of the lounge, and separation of the lounge dining area from the changing area together with prohibition of working shoes in the dining area. Six months after the implementation of these improvements, a remarkable decrease in the average blood lead level was observed both in the workers of the solder-casting process and in the non-lead workers. In addition, workers had become aware of the work environment and become positively concerned about good house-keeping after the improvement. This is an example of non-occupational (indirect) exposure to a toxic substance in an occupational setting. The importance of a comprehensive approach to improvement of the work environment will be discussed.

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## ABSTRACT 42

Airborne Asbestos Concentration in Rooms Sprayed with Asbestos-Containing Materials. K Sakai\*, N Hisanaga\*\*, K Mitani\*, H Tsuchiya\*, J Huang\*\*, E Shibata\*\*, Y Ono\*\*, A Kojima\*, and Y Takeuchi\*\*.

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The concentration of asbestos in air samples from 28 rooms sprayed with asbestos (sprayed rooms), 12 rooms without asbestos spraying (control rooms) and the neighboring outdoors of 13 investigated buildings (outdoors) was determined: samples were collected on membrane filters and analyzed by both analytical transmission electron microscopy (ATEM) and by phase contrast optical microscopy (PCM). Geometric mean concentrations of asbestos measured by ATEM (PCM) were 15 (0.20), 13 (0.17) and 14 (0.20) fibers/litre in the air of the sprayed rooms, reference rooms and the outdoors, respectively. The airborne asbestos concentrations did not correlate with the visible surface damage of the sprayed areas or with the time since spraying. Chrysotile, crocidolite and amosite were identified in the air samples. No correlation between the concentrations measured by ATEM and PCM was found. It was concluded that there was no difference between the airborne asbestos concentrations of sprayed rooms, reference rooms and outdoors.

ABSTRACT 43

Comfort and Health Standards in Underground constructions.  
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Architecture and Engineering, China.

As the area of usable urban ground space is reduced, there will be increasing utilization of ground space. Underground construction differs greatly from ground construction in many aspects, and may have an effect on the health and efficient working of people who are underground. The authors have conducted many investigations over a number of years into the different ways underground constructions are used in China. As a result, suggestions have been made for standards of comfort and health in underground constructions which cover: temperature; air velocity; relative humidity; concentration of harmful matter; total bacteria; and noise levels.

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ABSTRACT 44

Level and Dose of Radon and its Progeny in Underground Buildings in Wuhan City.  
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and Anti-Epidemic Station, P R China 430014.

The concentrations of  $^{222}\text{Rn}$  and its progeny in underground buildings (hotel, restaurant and market) in Wuhan City were measured with double layer filterpapers and scintillation methods. The concentration distribution was log-normal, and geometric mean of  $^{222}\text{Rn}$  in the buildings was  $74.8 \pm 38.0$  Eq. $\text{m}^{-3}$  and its progeny,  $10.9 \pm 15.2$  mWL. With the method recommended by ICRP, it is estimated that the annual effective dose equivalent from  $^{222}\text{Rn}$  progeny is 2.67 mSv which is as much as 346.7% of that in ground buildings in Wuhan City (0.77 mSv).

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ABSTRACT 45

Concentration and exposure dose of radon and its progeny in public bath houses at two hot springs.

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Using an emanation method, scintillation counter and a double layer filterpaper sampling instrument, the concentrations of  $^{226}\text{Ra}$  and  $^{222}\text{Rn}$  in hot spring water and Rn and its progeny in indoor air were measured in public bath houses. The results were as follows.

Concentration	Hot Spring A	Hot Spring B
Water. $^{226}\text{Ra}$ (Bq/l)	1.65 $\pm$ 0.03	1.62 $\pm$ 0.02
$^{222}\text{Rn}$ (Bq/l)	132 $\pm$ 8	130 $\pm$ 5
Indoor Air. Rn(Bq/m <sup>3</sup> )	308.1 $\pm$ 152.0	210.2 $\pm$ 126.0
Progeny (mWL)	85.2 $\pm$ 16.0	75.2 $\pm$ 21.0

With the method recommended by Report 50 of ICRP, it was estimated that the annual effective dose equivalent in hot spring A was 7.42 mSv and in hot spring B was 5.2 mSv.

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